

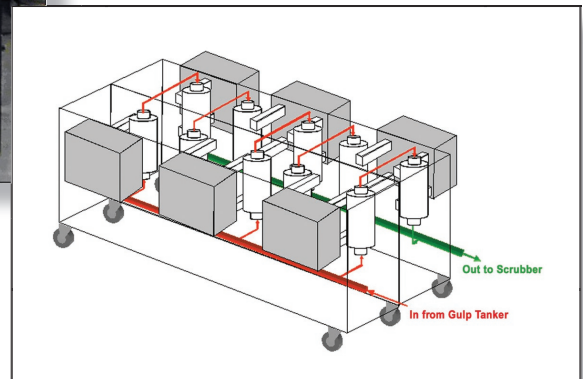


Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

MICROWAVE REACTOR TECHNOLOGY DEMONSTRATES SUCCESS AT ELIMINATING HAZARDOUS MATERIALS FROM SPACECRAFT



Full-scale laboratory testing of prototype versions of the microwave reactor revealed that the technology was greater than 99% efficient in the destruction of waste oxidizers and fuels. Testing also demonstrated that the reactor system does not generate any of the additional hazardous waste by-products associated with current treatment systems and methods. Successful implementation of the microwave reactor destruction system is expected to eliminate one of the largest waste streams at Cape Canaveral Air Force Station (AFS), Florida; Kennedy Space Center complex, Florida; and Vandenberg Air Force Base (AFB), California.



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Accomplishment

A team of scientists and engineers, including experts from the Materials and Manufacturing Directorate, developed a prototype technology capable of reducing or eliminating hazardous waste generated during the treatment of oxidizers and fuels used during operation of Air Force and National Aeronautics and Space Administration launch vehicles. During the collaboration between AFRL's Pollution Prevention Research and Development Team, Air Force Materiel Command's Pollution Prevention Integrated Product Team, Science Applications International Corporation (SAIC), and CHA Corporation, the team developed, tested, and validated the highly effective microwave reactor's capability to eliminate waste.

Background

AFRL conducted a research and development requirements survey for Air Force Space Command (AFSPC) to identify processes where hazardous materials could be reduced or eliminated. AFSPC identified eliminating hazardous waste by-products generated by spacecraft as a top priority.

The current treatment, a dual extraction method that uses a vacuum sweep, air stripping, and catalytic oxidation, is used for hazardous waste site remediation. Catalytic oxidation requires a significant amount of supplemental fuel, and it also produces secondary air pollutants including nitrogen oxides and dioxins. Using this treatment, hydrazine fuels and an oxidizer (dinitrogen tetroxide) used in spacecraft and launch vehicles still generate more than 300,000 pounds of hazardous waste by-product annually.

Under a contract between the directorate and SAIC, CHA Corporation was sub-contracted to demonstrate and validate a technology to treat the oxidizer and fuels while significantly reducing or eliminating the hazardous waste by-product. CHA Corporation used microwave energy to treat and destroy the waste oxidizer and fuels without producing any hazardous waste by-products. AFSPC began efforts to design, develop, and test a production scale microwave reactor unit.

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-ML-52)